

Listing of Claims:

1. (Previously Presented) An injection valve for an internal combustion engine comprising:

a control valve, which is activated electromagnetically and, using a valve actuator incorporating a valve rod, selectively closes and opens an opening for the passages of a fluid,

the valve rod of the valve actuator having at one end an actuator sealing surface cooperating with a sealing surface of the passage opening to selectively close and open the passage opening and to control the pressure in a control pressure space connected to the passage opening,

the valve actuator further having an actuator stop surface, larger than the actuator sealing surface, disposed at a distance from the actuator sealing surface at an opposite end of the valve rod, wherein the actuator stop surface at the opposite end of the valve rod cooperates with an opposing stop surface,

the valve rod having a length greater by an excess length than the distance between the passage opening sealing surface and the opposing stop surface of the control valve,

wherein, during a closing movement of the valve actuator, the excess length of the valve rod and the cooperation of the one end of the valve rod with the sealing surface and the opposite end of the valve rod with the stop surface provides a sealing function at the sealing surface by the one end of the valve rod while the opposite end of the valve rod provides for stopping of the valve rod and an associated damping function when the excess length is taken up by an elastic deformation of the valve rod.

2. (Previously Presented) The injection valve of claim 1, wherein the stop surface of the actuator is significantly larger than the sealing surface.

3. (Previously Presented) The injection valve of claim 1, wherein the valve actuator incorporates one of a one-part and a two-part valve rod.

4. (Previously Presented) The injection valve of claim 3, wherein the valve actuator contains a valve body, which touches a front face of the valve rod and contains the sealing surface of the actuator.

5. (Previously Presented) The injection valve of claim 4, wherein a valve body is constructed as a sphere, which interacts with the opening for the passage of fluid, forming a seal.

6. (Previously Presented) The injection valve of claim 3, wherein the sealing surface of the actuator is a front face of the valve rod.

7. (Previously Presented) The injection valve of claim 3, wherein the valve actuator is mushroom-shaped, a stem of the mushroom forming the valve rod and the actuator stop surface being an annular collar, concentrically surrounding the valve rod in a cap region of the mushroom.

8. (Previously Presented) The injection valve of claim 3, wherein the valve actuator is divided by a dividing joint into an actuator stop, having the stop surface of the actuator, and a valve rod, in operative connection with the sealing surface and the stop of the actuator.

9. (Previously Presented) The injection valve of claim 3, wherein the actuator stop is mushroom-shaped, the stop surface of the actuator being an end face thereof, contacting the valve rod in a foot region of the mushroom.

10. (Previously Presented) The injection valve of claim 3, wherein the valve rod is guided axially movably in at least one guide bushing.

11. (Previously Presented) The injection valve of claim 10, wherein a guide bushing is disposed at a small distance from the sealing surface of the actuator.

12. (Previously Presented) The injection valve of claim 3, wherein the length of the valve rod is an integer multiple of its diameter.

13. (Previously Presented) The injection valve of claim 1, wherein the sealing surface is formed in the end face of a disk-shaped insert part and adjoins the control pressure space on the side averted from the sealing surface.

14. (Previously Presented) The injection valve of claim 13, wherein the insert part is formed in two parts with a first part, which contains an opening for the passage of fluid and a discharge choke and a second part at the control pressure space side, with a borehole, which connects the control pressure space with an opening for the passage of fluid.

15. (Previously Presented) The injection valve of claim 14, wherein the second part contains an inlet choke, which is connected with the borehole.

16. (Previously Presented) An injection valve for an internal combustion engine comprising:

a control valve, which is activated electromagnetically and, using a valve actuator incorporating a valve rod, selectively closes and opens an opening for the passages of a fluid,

the valve rod of the valve actuator having at one end an actuator sealing surface cooperating with a sealing surface of the passage opening, to selectively close and open the passage opening and to control the pressure in a control pressure space connected to the passage opening,

the valve actuator further having an actuator stop surface, larger than the actuator sealing surface, disposed at a distance from the actuator sealing surface at an opposite end of the valve rod, wherein the actuator stop surface at the opposite end of the valve rod cooperates with an opposing stop surface,

the valve rod having a length greater by an excess length than the distance between the passage opening sealing surface and the opposing stop surface of the control valve,

wherein, during a closing movement of the valve actuator, the excess length of the valve rod and the cooperation of the one end of the valve rod with the sealing surface and the opposite end of the valve rod with the stop surface

provides a sealing function at the sealing surface by the one end of the valve rod while the opposite end of the valve rod provides for stopping of the valve rod and an associated damping function when the excess length is taken up by an elastic deformation of the valve rod, and

wherein the sealing surface is formed in the end face of a disk-shaped insert part and adjoins the control pressure space on the side averted from the sealing surface, and the insert part contains an inlet choke in addition to an outlet choke.

17. (Previously Presented) The injection valve of claim 13, wherein the control pressure space is connected with an inlet choke.

18. (Previously Presented) The injection valve of claim 13, wherein a rear end of a valve needle, averted from a nozzle needle seat surface, lies in the control pressure space.

19. (Previously Presented) The injection valve of claim 18, wherein the insert part forms a stop for the valve needle.

20. (Previously Presented) The injection valve of claim 13, wherein the insert part, a centering and holding clamp and a sleeve, in which the valve rod and at least one guide bushing with the actuator stop surface is taken up, form a structural unit, which can be separately pre-adjusted with respect to the protrusion of the valve rod.

21. (Previously Presented) An injection valve for an internal combustion engine comprising:

an opening having a sealing surface;
a stop displaced a distance from the opening having an opposing stop surface; and

an electromechanical control valve including:
a valve actuator having an opening position and a closing position,
the valve actuator including:

an actuator sealing surface that engages the sealing surface of the opening when the valve actuator is at the closing position,

an actuator stop surface that engages the opposing stop surface when the valve actuator is at the closing position, and

a valve rod defining at one end the actuator sealing surface and at an opposite end the actuator stop surface,

wherein the valve rod has a length greater by an excess length than the distance between the sealing surface of the opening and the opposing stop surface,

and wherein, during a closing movement of the valve actuator, the excess length of the valve rod and the engagement of the one end of the valve rod with the sealing surface and the opposite end of the valve rod with the stop surface provides a sealing function at the sealing surface by the one end of the valve rod while the opposite end of the valve rod provides for stopping of the valve rod and an associated damping function when the excess length is taken up by an elastic deformation of the valve rod.

22. (Previously Presented) The injection valve of claim 21, wherein the stop surface of the actuator is significantly larger than the sealing surface.

23. (Previously Presented) The injection valve of claim 21, wherein the valve actuator is formed with one of a one-part and a two-part valve rod.

24. (Previously Presented) The injection valve of claim 23, wherein the valve actuator contains a valve body, which is positioned at a front face of the valve rod and contains the sealing surface of the actuator.

25. (Previously Presented) The injection valve of claim 24, wherein the valve body has the configuration of a sphere.

26. (Previously Presented) The injection valve of claim 23, wherein the sealing surface of the valve actuator is a front face of the valve rod.

27. (Previously Presented) The injection valve of claim 23, wherein the valve rod is axially movably guided in a guide bushing.

28. (Previously Presented) The injection valve of claim 27, wherein a guide bushing is disposed near the actuator sealing surface.

29. (Previously Presented) The injection valve of claim 23, wherein the length of the valve rod is an integer multiple of its diameter.

30. (Previously Presented) The injection valve of claim 21 further comprising a disk-shaped insert having a first end face that includes the sealing surface, and a second end face adjoining a control pressure space.

31. (Previously Presented) The injection valve of claim 30, wherein the insert has a first part, which includes the opening and a discharge choke, and a second part, which includes a borehole that connects the control pressure space with the opening.

32. (Previously Presented) The injection valve of claim 31, wherein the second part of the insert includes an inlet choke, which is connected with the borehole.

33. (Previously Presented) The injection valve of claim 30, wherein the insert includes an inlet choke.

34. (Previously Presented) The injection valve of claim 30, wherein the control pressure space is connected to the inlet choke.

35. (Previously Presented) The injection valve of claim 30 comprising a valve needle having an end disposed in the control pressure space.

36. (Previously Presented) The injection valve of claim 35, wherein the insert part forms a stop for the valve needle.

37. (Previously Presented) The injection valve of claim 30 further comprising a centering and holding clamp and a sleeve, wherein the insert part, the centering and holding clamp and the sleeve, in which the valve rod and the guide bushing that includes the actuator stop surface are placed, form a structural unit, which can be pre-adjusted with respect to a protrusion of the valve rod.